

## 3.12 Paleontology

### 3.12.1 Regulatory Setting

Paleontology is a natural science focused on the study of ancient animal and plant life as it is preserved in the geologic record as fossils. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized projects. Under California law, paleontological resources are protected by the California Environmental Quality Act (CEQA).

### 3.12.2 Affected Environment

The information in this section is based on the *Supplemental Paleontological Resources Identification and Evaluation Report* (September 2011) and the *Paleontological Resources Identification and Evaluation Report* (PIR/PER, March 2008).

Paleontological resources (fossils) are defined as any trace of a past life form. While wood, bones, teeth, and shells are the most common fossils, under certain conditions soft tissues, tracks, and trails may be preserved as fossils. Fossils are most commonly found in sedimentary rock layers.

#### 3.12.2.1 Literature Review and Records Search

A locality search was conducted, which included a review of area geology and any fossil resources recovered within similar sediment to those that will be encountered during the project. The purpose of a locality search is to establish the status and extent of previously recorded paleontological resources within and adjacent to the MCP project area and to determine which geologic sediments are likely to be exposed during ground-disturbing activities associated with the project. With this knowledge, an informed assessment of the area can be made of the potential effects of the proposed project on paleontological resources, anticipating the kinds of resources that might be encountered during earthmoving activities, and determining the paleontological sensitivities for each geologic formation or unit exposed in the project area.

The geologic review utilized recent geologic mapping summaries to verify the location, extent, and lithologic descriptions of sedimentary formations within the proposed rights of way.

A paleontological literature review was conducted for the proposed project using unpublished reports, paleontological assessment and monitoring reports, field notes, and published literature. During the preparation of the original PIR/PER for the MCP project

(2008), locality searches were conducted through the Geological Sciences Division of the San Bernardino County Museum, the Natural History Museum of Los Angeles County, and the Riverside Metropolitan Museum. In February 2011, new locality searches were conducted at the Geological Division of the San Bernardino County Museum and the Western Science Center to ensure that no additional resources had been discovered.

The Geological Division of the San Bernardino County Museum responded on March 7, 2011, that sediments of Pleistocene older alluvium (approximately 10,000 to 300,000 years old) are present on the surface and within the subsurface of the project area. In addition, a search of the Regional Paleontologic Locality Inventory indicates that there are no known paleontological localities within the project area; however, there are two localities that are located approximately 0.25 to 0.5 mile (mi) southeast of the project area, south of the Bernasconi Hills, within Pleistocene alluvium that is similar to the sediments that are within the project area.

Based on this information, the Geological Division of the San Bernardino County Museum believes that the Pleistocene sediments within the project area have high paleontological sensitivity and the development of the MCP in Riverside County, California, has a high potential to adversely impact significant nonrenewable paleontological resources. As such, the Museum recommends that a qualified professional, vertebrate paleontologist must be retained to develop a program to mitigate adverse impacts to paleontological resources. This mitigation program would need to be consistent with provisions of the CEQA, as well as with regulations implemented by the County of Riverside and with the proposed guidelines of the Society of Vertebrate Paleontology.

The Western Science Center stated on February 23, 2011, that geologic units within the project area included Holocene to Pleistocene Alluvium and the Cretaceous Lakeview Pluton [Tonolite-type granite]. The Western Science Center does not know of any fossil localities within the project area. However, the Western Science Center states that fossils are known from similar Pleistocene alluvial sediments that occur within the project area located 2 to 6 mi from the project area on projects associated with the San Diego 6 Canal and the Diamond Valley Reservoir, respectively. The Western Science Center states that the Pleistocene alluvium is considered to have a high paleontological sensitivity while the Lakeview Pluton has a low paleontological sensitivity, and that any fossils recovered would be scientifically significant.

### **3.12.2.2 Field Inspection**

A vehicular survey of the MCP study area was conducted during May 2005 and again in December 2006. The survey verified the results of the literature review and the analysis of the geologic mapping along the rights of way mapped for the MCP Build Alternatives.

A foot survey was conducted between April and July 2005. Paleontological crew members walked parallel transects along all areas within the proposed MCP rights of way that the records and literature search had determined might contain sediments that could contain paleontological resources or had undetermined sensitivity.

On March 30, 2011, surveys were conducted at areas of the project's Build Alternatives that were added since the original PIR/PER (March 2008) were prepared.

### **3.12.2.3 Geology**

The proposed MCP project is located in the northwestern Peninsular Range geologic province of southern California. This province is bounded on the north by the Transverse Ranges, on the east by the Colorado Desert, and on the west by the Pacific Ocean. The Peninsular Range geomorphic province is a 900 mi long northwest-southeast trending region that extends from the tip of Baja California in Mexico to the Transverse Ranges in southern California and includes the Los Angeles Basin. The Peninsular Range contains extensive pre-Cretaceous (greater than 65 million years ago) igneous and metamorphic rocks, covered by limited exposures of post-Cretaceous sedimentary deposits.

More specifically, the project is located within a structural feature known as the Perris Block within the northwestern portion of the Peninsular Range geomorphic province. The Perris Block extends from the southern foot of the San Gabriel and San Bernardino Mountains southeast to the vicinity of Bachelor Mountain and Poly Butte. It is bounded on the southwest by the Elsinore Fault Zone and on the northeast by the San Jacinto fault. The surface of the Perris Block consists of granitic exposures that have been tectonically tilted eastward, leaving granitic outcrops elevated and exposed on the west side of the Perris Block (Jurupa Hills) and allowing Pleistocene sediments to cover the east side, filling the eastern San Bernardino, Lakeview, Perris, and San Jacinto Valleys. This stratigraphic relationship suggests that the block tilted eastward prior to middle or late Pleistocene time. The Santa Ana River is north of the project and has incised the Perris Block from its northern margin to the Elsinore Fault Zone.

Based on geologic mapping, alluvial sediments ranging in age from the early Pleistocene to recent are present at the surface within the project area. In addition, Cretaceous (approximately 100 million years old) igneous rocks such as granite are also present in

some areas, but are not conducive to the preservation of fossils. The sedimentary units are summarized in Table 3.12.A and described in more detail below.

**Table 3.12.A Geologic Time Periods and Sedimentary Units within the MCP Project Area**

Epoch	Age (Years Ago)	Geologic Formation/Unit	Map Symbol
<b>Quaternary Period</b>			
Latest Holocene	Less than several 100	Very Young Alluvial Valley Deposits	Qv
Holocene to latest Pleistocene	Several 100 to 10,000	Young Alluvial Valley Deposits	Qyv
Holocene to latest Pleistocene	Several 100 to 10,000	Young Alluvial Fan Deposits	Qyf
Late to middle Pleistocene	10,000 to 300,000	Old Alluvial Fan Deposits	Qof
Late to middle Pleistocene	10,000 to 300,000	Old Alluvial Valley Deposits	Qov
Late to middle Pleistocene	10,000 to 300,000	Old Mixed Alluvial Valley and Fan Deposits	Qofv
Early Pleistocene	1 to 2 million years	Very Old Alluvial Fan Deposits	Qvof

Source: *Supplemental Paleontological Resources Identification and Evaluation Report* (September 2011).

MCP = Mid County Parkway

### ***Very Young Alluvial Valley Deposits***

Very Young Alluvial Valley Deposits (Qv) represent the recently active fluvial deposits on valley floors. These deposits are also known as recent alluvium, Holocene Alluvium, or Active Wash Deposits. These sediments are primarily found within the active depositional and/or erosional area of a stream channel. In general, they were deposited during the latest Holocene and are less than several hundred years in age. They are located within or very close to an active stream channel. These deposits consist of loosely consolidated mixtures of gravel, sand, and silt, ranging from poorly sorted to well-sorted. The sand grains are generally subangular to subrounded, while the gravels and cobbles are rounded to well-rounded. Color is usually gray to yellow-brown to gray-brown, and is usually dependent on the nearby, or upstream, geology.

### ***Young Alluvial Valley Deposits***

Young Alluvial Valley Deposits (Qyv) are similar in composition to the Very Young Alluvial Deposits described above. They are also found on the valley floors; however, they are generally older, ranging from several 100 up to 10,000 years and can be located away from, but flanking, the active river/stream channel. They were deposited during the Holocene to latest Pleistocene.

### ***Young Alluvial Fan Deposits***

Young Alluvial Fan Deposits (Qyf) are found at the mouths of canyons where they enter the valley. They were deposited during the Holocene to latest Pleistocene and range in age from several 100 years up to a maximum of 10,000 years. They are composed mixtures of coarse-grained sand, cobble- and gravel-sand deposits. These deposits are

generally unconsolidated to slightly consolidated. Colors are variable and based on upstream geology, but are usually shades of gray to yellow-brown.

### ***Old Alluvial Fan Deposits***

Old Alluvial Fan Deposits (Qof) are usually located at the bases of steep bedrock slopes. They were deposited during the late to middle Pleistocene, and range in age from 10,000 to 300,000 years old. They are composed of reddish-brown mixtures of silty sand with some lenses containing concentrations of gravels and cobbles. They are indurated, and can be slightly- to moderately dissected by gullies. In addition, some areas contain thin, discontinuous surficial layers of Holocene alluvial fan sediments that have been deposited more recently.

### ***Old Alluvial Valley Deposits***

Old Alluvial Fan Deposits (Qov) were deposited during the late to middle Pleistocene (10,000 to 300,000 years ago). They are composed of gray, sandy alluvium that contains some pebbles and gravels. These deposits are slightly indurated. They represent older deposition by streams and rivers within the valley bottoms.

### ***Old Mixed Alluvial Valley and Fan Deposits***

Old Mixed Alluvial Valley and Fan Deposits (Qofv) are interfingering mixtures of Old Alluvial Fan Deposits and Old Alluvial Valley Deposits. They were deposited during the late to middle Pleistocene and range in age from 10,000 to 300,000 years old. In some areas they are overlain by thin discontinuous layers of Very Young Alluvial Valley Deposits that were deposited very recently.

### ***Very Old Alluvial Fan Deposits***

Very Old Alluvial Fan Deposits (Qvof) were deposited during the Early Pleistocene (approximately 1 to 1.8 million years ago). They are similar in composition to the other alluvial fan deposits that are described above. Color is generally shades of reddish-brown. They are well-indurated and consolidated, and are also cut into and have been dissected by gulleys. They also contain hardpans cemented with silica, known as duripans and silicretes. They are usually found flanking steep bedrock slopes.

#### **3.12.2.4 Paleontological Resources**

Quaternary sediments near and within the project study area were deposited during the Pleistocene and Holocene epochs (1.8 million years ago to the present). Geologic mapping has divided the sediments by possible age range (based on degree of surficial erosion, soil development, and stratigraphic context) into early Pleistocene (Very Old), late to middle Pleistocene (Old), late Pleistocene to Holocene (Young), and latest

Holocene (Very Young). The Holocene includes the last 10,000 years of geological time, considered to be the “Recent,” but at the older end of the spectrum contains important fossil evidence about the transition from the Pleistocene “Ice Ages” into the warmer and drier Holocene. Mammoths (*Mammuthus* sp.) are the indicator fossil for the Pleistocene Epoch, which is divided into the older Irvingtonian North American Land Mammal Age (1.8 million to 300,000 years ago), and the Rancholabrean North American Land Mammal Age, which spans the last 300,000 years of the Pleistocene. The indicator fossil for the Rancholabrean North American Land Mammal Age is Bison (*Bison* sp.). Both North American Land Mammal Ages contain other smaller mammals, such as horses and coyotes, as well as rodents, birds, reptiles, and fish that help describe climatic and habitat conditions during the last 2 million years.

Quaternary sediments are derived from two sources: Locally (colluvium) from the outcrops of bedrock making up mountain ranges and hills, and from a distance with transportation along streams and rivers (alluvium). Within alluvium, the grain size (including the size of gravel and cobbles) is generally larger near the source, and finer-grained away from the source in mid-valley deposits. The finer-grained, mid-valley silt and pond deposits are usually better for the preservation of fossils. Although the near source deposits are generally coarser-grained, there are often soil horizons with ancient soil horizons (paleosols) developed on the slopes of alluvial fans. Both fine-grained mid-valley deposits and paleosols on the valley margin are conducive to the preservation of significant, nonrenewable paleontological resources.

### ***Holocene Sediments***

Although younger alluvium can contain remains of plants and animals, generally not enough time has passed for the remains to become fossilized. In addition, the remains are contemporaneous with modern species, and these remains are usually not considered to be significant. It should be noted that although an area may be mapped with younger alluvium on the surface, deposits of older alluvium or other nearby geologic formations are often encountered as shallow as 5 to 10 ft below the surface, and these older sediments can and do contain fossils.

### ***Pleistocene Alluvium***

In the southern Perris Block, north of Murrieta and including French and Menifee Valleys (9 to 15 mi south of the MCP project area), literature describes “older alluvium” that sits on granitic and sedimentary rocks above elevations of approximately 1,300 feet (ft). These sediments contain a diverse fauna of vertebrate animals of latest Pleistocene Rancholabrean North American Land Mammal Age, including Bison sp., the late

Pleistocene indicator species. Additionally, the fauna contains amphibians found in greenish-gray silty sands that are interpreted as having been deposited in ponds or marshlands. Gophers, woodrats, and cottontail rabbits would have inhabited the brush and grass-covered soil that surrounded the marshlands. These small mammals speciate rapidly and are extremely important for determination of the age of sedimentary deposits. The review of literature indicated that an Ice Age horse skull was recovered from excavations at Lake Skinner and fossil horse, camel, mammoth, and deer were recovered in French Valley and in Menifee Valley. The fossils in French Valley and Menifee Valley were all recovered beginning at depths of between 2 and 5 ft below the surface.

In the central portion of the Perris Block, the Lakeview Hot Springs site, located immediately south of the MCP project, has produced a complex fauna including the saber cat *Smilodon* (the California state fossil) in association with mammoth and other large and small mammals, reptiles, and gastropods, as well as wood and seeds. This fauna from the central Perris Block indicates that terminal Pleistocene time (10,000 years before present) sediments are found as near to the surface as 15 ft. Slow rates of deposition and shallow depths to Pleistocene and Pliocene fossiliferous sediments are also indicated by the presence of the Nomlaki Ash 20 ft deep in excavations at Romoland. This early Pliocene Ash has been dated at 4.5 million years. In eastern Moreno Valley, charcoal from geotechnical trenches at a depth of 8 ft has been dated by the accelerator mass spectrometer method at 8,340 +/- 110 years.

More than 1,700 paleontological resource localities are known from excavation of the Diamond Valley Reservoir, located approximately 12 mi south of the MCP project. The late Pleistocene vertebrate fossils from this site include bison, a very large mastodon, mammoth, giant ground sloth, horse, deer, and coyote, along with small mammals such as cottontail rabbit, gopher, deer mice, meadow mice, and kangaroo rats. These small mammals are extremely important for determination of the age of sedimentary deposits. Like the French Valley sites, the presence of pond turtle, freshwater snails, and lakeshore plants suggest a lakeshore or marshland environment of deposition. Associated plant remains include ponderosa pine and several species of manzanita suggesting that a forest-chaparral mosaic covered the nearby slopes. This very complete Pleistocene fauna from the Perris Block demonstrates that latest Pleistocene sediments occur less than 15 ft below the present surface.

The potential for near-surface late Pleistocene fossils from the Perris block has been noted and summarized above, the 5 to 10 ft depth of occurrence of Pleistocene fossils in the near surface is consistent with that elsewhere in the southern California area. All

proposed Build Alternatives of the MCP cross Pleistocene sediments that have the potential to encounter significant, nonrenewable paleontological resources. The literature review for this study located several fossil localities within the study area that are attributed to the Pleistocene sedimentary deposits.

### **3.12.2.5 Paleontological Sensitivity**

A formation or rock unit has paleontological sensitivity if it previously has produced, or has characteristics conducive to the preservation of, vertebrate fossils and associated fossil environmental indicators or regionally uncommon invertebrate and plant fossils. All sedimentary rocks and certain volcanic and mildly metamorphosed rocks are considered to have sensitivity for paleontological resources.

All geologic units within the study area were assigned Paleontological Sensitivity ratings that are consistent with those identified from the Riverside County General Plan, these being High A (sensitive at the surface); High B (sensitive at depth), or Low:

- High sensitivity is based on formations or mappable rock units that are known to contain or have the correct age and depositional conditions to contain significant paleontological resources. The high rating is often divided into two subcategories of High A and High B:
  - High A includes areas where nonrenewable paleontological resources are known to occur within geological units beginning at the surface.
  - High B indicates areas of high sensitivity where sediments containing paleontological resources are expected to be encountered at depth. The depth at which these sediments occur is determined based on other paleontological finds in close proximity to the project, or by reviewing geotechnical boring logs that locate such sediments.
- Low sensitivity is determined by a qualified vertebrate paleontologist conducting a literature and records review, as well as a field survey. Low sensitivity cannot be determined simply by looking for rock unit descriptions on a geologic map. For instance, an area mapped as Recent Alluvium may actually be a thin, surficial layer of nonfossiliferous sediments covering fossil-rich Pleistocene sediments. An area mapped as granite may be covered by a Pleistocene soil horizon that contains fossils. The actual sensitivity must be determined by a records search and field inspection.

Table 3.12.B provides a summary of the paleontological sensitivities for all the geologic units that will be crossed by the MCP Build Alternatives. The MCP Paleontological Resource Sensitivity Map (Figure 3.12.1) graphically presents a summary of paleontological sensitivities in the study area.

**Table 3.12.B Paleontological Sensitivities within the MCP Project Area**

Geologic Formation/Unit	Map Symbol	Paleontological Sensitivity
Very Young Alluvial Valley Deposits	Qv	High B (high at depth)
Young Alluvial Valley Deposits	Qyv	High B (high at depth)
Young Alluvial Fan Deposits	Qyf	High B (high at depth)
Old Alluvial Fan Deposits	Qof	High A (high at surface)
Old Alluvial Valley Deposits	Qov	High A (high at surface)
Old Mixed Alluvial Valley and Fan Deposits	Qofv	High A (high at surface)
Very Old Alluvial Fan Deposits	Qvof	High A (high at surface)
Igneous Rocks	Various	Low

Source: Supplemental Paleontological Resources Identification and Evaluation Report (September 2011).

### 3.12.3 Environmental Consequences

#### 3.12.3.1 Permanent Impacts

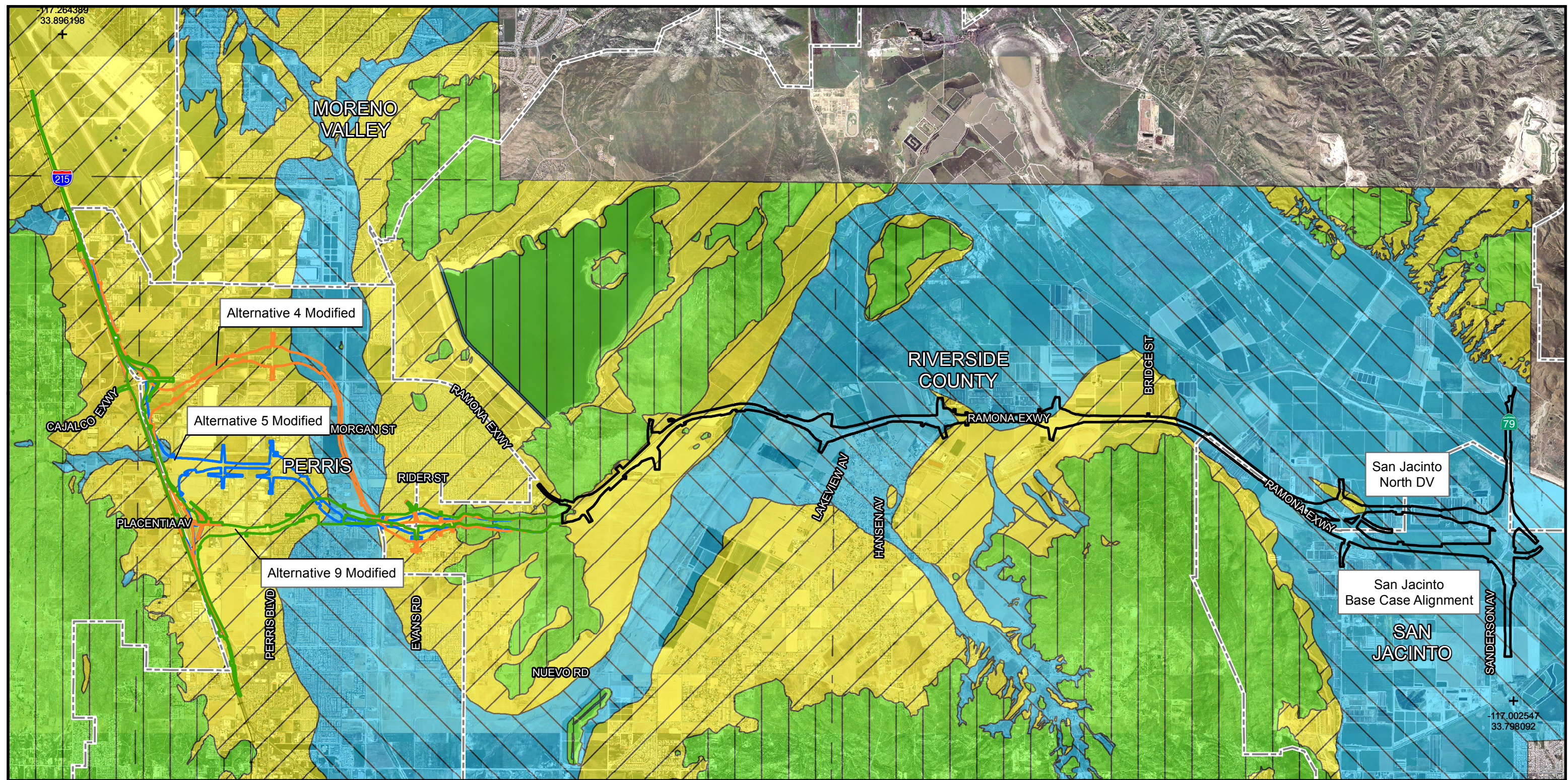
##### **Build Alternatives**

Fossils and their associated contextual data are significant nonrenewable scientific resources, and the loss of these resources resulting from construction of the MCP Build Alternatives would be the primary impact on paleontological resources. Earthmoving operations would result in the destruction of fossils and fossiliferous rock units within the construction disturbance limits. It is often not possible to completely eliminate impacts to fossil resources. It is understood that earthmoving activity would, unavoidably, destroy some fossils. These types of impacts can be partially mitigated by collecting and preserving a representative sample of the entire fossil assemblage and associated geologic information in the areas disturbed by project construction.

Permanent impacts from the MCP Build Alternatives on paleontological resources would include:

- Destruction of paleontological resources
- Damage to paleontological resources during grading
- Destruction of rock units that may contain paleontological resources
- Loss of contextual data associated with paleontological resources
- Loss of associations between paleontological resources

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# LEGEND

## Limits of Proposed Improvements

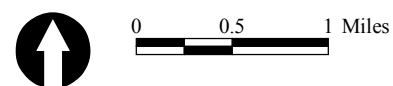
- Alternative 4 Modified
- Alternative 5 Modified
- Alternative 9 Modified
- Alternatives 4, 5, and 9 Modified and Design Variations

## Paleontological Sensitivity

- High Paleontological Sensitivity at Surface
- High Paleontological Sensitivity at Depth
- Low Paleontological Sensitivity

- City/County Boundary
- Planned Roads
- +— Railroad

SOURCE: EagleAerial (3/2010); TBM (2008); Jacobs (2/2011); Morton and Miller (2006)



I:\UCV531\GIS\_Mod\EIR\_EIS\DraftFinalFigures\Paleo\_Sensitivities.mxd (11/11/2014)

FIGURE 3.12.1

## Paleontological Resource Sensitivity Map

08-RIV-MCP PM 0.0/16.3; 08-RIV-215 PM 28.0/34.3  
EA 08-0F3200 (PN 0800000125)



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Table 3.12.C provides a comparison of the area (acreage) of sediment with high paleontological sensitivity for each Build Alternative. Table 3.12.C compares the acreage of high sensitivity including High A (high at surface) and High B (high at depth), with the low sensitivity acreage along each Build Alternative. Analysis of paleontological sensitivity indicates that all Build Alternatives are similar in the total areas disturbed for construction, ranging from 1,208 acres (ac) (Alternative 9 Modified with San Jacinto North Design Variation [SJRB DV]) to 1,304 ac (Alternative 4 Modified with SJRB DV). In addition, the proportion of right of way for each Build Alternative considered to have a high sensitivity for paleontological resources ranges from 93 to 94 percent; therefore, all Build Alternatives are considered to have a high level of sensitivity for paleontological resources along most of their lengths. Therefore, sensitivity impacts to paleontological resources are functionally the same for all three modified Build Alternatives. For the preferred alternative (Alternative 9 Modified with the SJRB DV), a total of 1,244 acres of area with high paleontological sensitivity would be disturbed, representing 94 percent of the total area disturbed by this alternative.

Another permanent impact of the MCP Build Alternatives on paleontological resources would be the provision of access to currently inaccessible areas of Riverside County and the cities of Perris and San Jacinto, thereby increasing human presence in those areas. Increased human presence afforded by this access can create opportunities for increased disturbance to paleontological resources, including:

- Human-created erosion;
- Increased natural erosion due to human modification of the environment;
- Damage or erosion created by off-road motor vehicle traffic; and
- Increased illegal access to, disruption of, and unauthorized collecting of exposed fossil resources by construction personnel during MCP project construction, or by amateur collectors during construction and operation of the MCP project.

To reduce impacts to any paleontological resources that may be present within the project area where excavation may take place in areas of undisturbed soils, a Paleontological Mitigation Plan (PMP), as specified below in Measure PAL-1, would be implemented during construction. All fossils collected during construction would be deposited for permanent curation and storage into an established repository. The recovery of fossils as part of the construction of the MCP Build Alternatives would make new information available to scientists, educators, and the general public that they would not possess without construction of the project. Fossil recovery and new data would be beneficial effects of the project, including new data on the evolutionary relationships and

**Table 3.12.C MCP Build Alternatives in Relation to Sensitive Geologic Units**

Level of Sensitivity	Sensitive Acres	High Sensitivity % Total
<b>Alternative 4 Modified</b>		
Low	95 acres	--
High A (surface)	659 acres	47 % sensitive
High B (subsurface)	642 acres	46 % sensitive
High Total <sup>1</sup>	1,301 acres	<b>93 % sensitive</b>
<b>Alternative 4 Modified SJN DV</b>		
Low	95 acres	--
High A (surface)	677 acres	50 % sensitive
High B (subsurface)	590 acres	43 % sensitive
High Total <sup>1</sup>	1,267 acres	<b>93 % sensitive</b>
<b>Alternative 4 SJRB DV</b>		
Low	95 acres	--
High A (surface)	660 acres	47% sensitive
High B (subsurface)	644 acres	46% sensitive
High Total <sup>1</sup>	1,304 acres	<b>93% sensitive</b>
<b>Alternative 5 Modified</b>		
Low	90 acres	--
High A (surface)	678 acres	49 % sensitive
High B (subsurface)	613 acres	44 % sensitive
High Total <sup>1</sup>	1,291 acres	<b>93 % sensitive</b>
<b>Alternative 5 Modified SJN DV</b>		
Low	90 acres	--
High A (surface)	696 acres	52 % sensitive
High B (subsurface)	561 acres	42 % sensitive
High Total <sup>1</sup>	1,257 acres	<b>94 % sensitive</b>
<b>Alternative 5 SJRB DV</b>		
Low	90 acres	--
High A (surface)	679 acres	49 % sensitive
High B (subsurface)	615 acres	44 % sensitive
High Total <sup>1</sup>	1,294 acres	<b>94 % sensitive</b>
<b>Alternative 9 Modified</b>		
Low	89 acres	--
High A (surface)	618 acres	46 % sensitive
High B (subsurface)	625 acres	47 % sensitive
High Total <sup>1</sup>	1,243 acres	<b>93 % sensitive</b>
<b>Alternative 9 Modified SJN DV</b>		
Low	89 acres	--
High A (surface)	635 acres	49 % sensitive
High B (subsurface)	573 acres	44 % sensitive
High Total <sup>1</sup>	1,208 acres	<b>93 % sensitive</b>
<b>Alternative 9 Modified SJRB DV</b>		
Low	89 acres	--
High A (surface)	618 acres	46 % sensitive
High B (subsurface)	626 acres	47 % sensitive
High Total <sup>1</sup>	1,244 acres	<b>93 % sensitive</b>

**Table 3.12.C MCP Build Alternatives in Relation to Sensitive Geologic Units**

Level of Sensitivity	Sensitive Acres	High Sensitivity % Total
<b>Alternative 9 Modified SJRB DV (Preferred Alternative)</b>		
Low	89 acres	--
High A	618 acres	46% sensitive
High B	626 acres	47% sensitive
High Total <sup>1</sup>	1,244 acres	93% sensitive

Sources: *Supplemental Paleontological Resources Identification and Evaluation Report* (September 2011) and LSA Associates, Inc. (2014).

<sup>1</sup> High Total is only the addition of "High A" and "High B." It does not include the "Low."

-- = not applicable

MCP = Mid County Parkway

SJN DV = San Jacinto North Design Variation

SJRB DV = San Jacinto River Bridge Design Variation

developmental trends among organisms, information on the age of rock units or sedimentary strata, depositional history of the region and timing of geologic events, development of biological communities, interactions between ancient plant and animal species, geographic restrictions of past species, and unusual or spectacular circumstances in the history of life. Recovered fossil specimens or casts of specimens could also serve as a source of educational material and be incorporated into exhibits for public display.

### **No Build Alternatives**

Under the MCP No Build Alternatives 1A and 1B, the permanent impacts discussed above for the MCP Build Alternatives would not occur for the MCP project itself, but impacts to paleontological resources in other areas could occur for the other transportation improvement projects included in the No Build Alternatives 1A and 1B that would require grading or excavation in areas with high paleontological resource sensitivity.

### **3.12.3.2 Temporary Impacts**

#### **Build Alternatives**

Direct impacts to paleontological resources resulting from construction of any of the MCP Build Alternatives would be permanent. Therefore, impacts to paleontological resources are considered permanent, not temporary, as discussed above.

#### **No Build Alternatives**

As discussed above for the MCP Build Alternatives, impacts to paleontological resources are considered permanent, not temporary. Although the MCP project would not be built under the No Build Alternatives 1A and 1B, impacts to paleontological resources could result from other transportation improvement projects included in the No Build

Alternatives 1A and 1B that would require grading or excavation in areas with high paleontological resource sensitivity.

### **3.12.4 Avoidance, Minimization, and/or Mitigation Measures**

Since the MCP project could adversely impact paleontological resources during ground-disturbing activities, mitigation is required. Implementation of PAL-1, described below, requires RCTC to prepare a PMP during final design and implement that PMP during construction, to reduce impacts to paleontological resources.

**PAL-1 Paleontological Mitigation Plan.** During final design, the Riverside County Transportation Commission (RCTC) Project Engineer will require the qualified principal paleontologist under contract to RCTC to prepare a *Paleontological Mitigation Plan* (PMP). The PMP will provide guidance for developing and implementing paleontological mitigation efforts, including field work, laboratory methods, and curation during construction of the Mid County Parkway (MCP) project. The PMP will primarily be prepared following the guidelines in the California Department of Transportation (Caltrans) *Standard Environmental Reference* (SER), Environmental Handbook, Volume I, Chapter 8 – Paleontology. In addition, the PMP will be prepared following guidance from the General Plan of the County of Riverside, and the guidelines of the Society of Vertebrate Paleontology. The PMP will be specifically tailored to the resources and sedimentary formations that are within the project disturbance limits.

The PMP will include, but not be limited to, the following to reduce impacts to paleontological resources from ground-disturbing activities associated with the construction of the project:

- Description of the responsibilities and qualifications of the qualified principal paleontologist and the qualified paleontological monitors (who are qualified to identify vertebrate, invertebrate, and plant fossils).
- Description of the communication channels among the qualified principal paleontologist, the qualified paleontological monitors, the RCTC Project Manager and Engineer, and the Construction Contractor.

- Development of a detailed Monitoring Plan for paleontological resource monitoring defining the specific monitoring requirements and procedures during all ground-disturbing and excavation activities in areas of High A and High B sensitivity.
- Development of specific procedures for temporarily halting or redirecting work at an area of a discovery of paleontological resources to permit the present within the locality.
- Development of a detailed plan for the recovery, analysis, identification, processing, and cataloguing of fossils recovered during ground-disturbing and excavation activities.

The activities in the PMP will be implemented as described in the following steps:

- Prior to any ground-disturbing or excavation activities, the qualified principal paleontologist or his/her representative will participate in preconstruction and pregrading conferences with the RCTC Project Manager and Project Engineer, and the Construction Contractor. At this meeting, the qualified principal paleontologist, or his/her representative, will explain the likelihood for encountering paleontological resources during construction, what resources may be discovered, and the methods that will be employed to recover fossils if anything is discovered, consistent with the procedures established in the PMP.
- RCTC's Resident Engineer will require the Construction Contractor to comply with the provisions of the PMP during all ground-disturbance, grading, and excavation activities, including appropriate coordination with RCTC's qualified principal paleontologist.
- The curation facility should be identified prior to the beginning of excavation activities. At a minimum, a draft curation agreement should be in place between the curation facility, the land owner (RCTC), and the qualified principal paleontologist. This will ensure that collected resources have a permanent home and that the resources are prepared, identified, and cataloged following procedures acceptable to the curation facility.
- After vegetation, pavement, and structures are removed, the qualified principal paleontologist and/or qualified paleontological monitors will conduct a preconstruction field survey in areas identified as having

high paleontological sensitivity. Observed surface paleontological resources in those areas will be collected by the qualified principal paleontologist, the qualified paleontological monitors, and/or other staff prior to the beginning of additional ground-disturbing activities in those areas.

- A qualified paleontological monitor will be present during ground-disturbing and excavation activities within the project disturbance limits in potentially fossiliferous formations and/or geologic units crossed by the MCP project facilities as defined in the PMP. Consistent with the PMP, the monitoring for paleontological resources will be conducted on a full-time basis where fossiliferous sediments are exposed at the surface (High A) and at elevations where excavation is 3 feet (ft) below the surface where paleontological resources are anticipated at depth (High B).
- Monitoring may be reduced to a part-time basis if no resources are being discovered in sediments with a high sensitivity rating. Any reduction or modification in scheduling of monitoring will be determined by the qualified principal paleontologist in cooperation and consultation with RCTC's Resident Engineer.
- If paleontological resources are discovered during ground-disturbing and excavation activities, the qualified principal paleontologist shall implement the appropriate actions consistent with the PMP and in cooperation with the RCTC Resident Engineer, for recovery and collection of the fossil resources.
- The qualified principal paleontologist and qualified paleontological monitors will be empowered to temporarily halt or redirect construction activities around a discovery to reduce adverse impacts to paleontological resources by allowing for the collection of individual or multiple paleontological resources at the paleontological locality. The qualified principal paleontologist and qualified paleontological monitors will be equipped to rapidly remove any large or small fossil specimens encountered during excavation to locations away from the active construction areas to either a safe area within the overall project disturbance limits or an off-site laboratory setting. If large mammal fossils or large concentrations of fossils are encountered, RCTC's Resident Engineer will require the Construction Contractor to make heavy equipment available to assist in the removal and collection of

those larger materials. The use of heavy equipment will speed up the recovery and collection process and reduce delays to construction activities.

- Upon encountering a large deposit of fossils, the monitor will attempt to salvage all identifiable vertebrate fossils, and a representative sample of invertebrate fossils using additional field staff, if required. Collection of specimens will be completed in accordance with modern paleontological techniques. If the deposit extends outside the work area, or deeper into the ground than any proposed excavation, detailed notes, sketches, and photographs may be taken in lieu of further attempts to collect fossil resources that would be outside the project limits or excavation conditions.
- For each newly discovered fossil locality, the qualified principal paleontologist shall submit a brief summary report to RCTC that describes an initial analysis of the discovery such as preliminary identification of the fossil specimen(s), the location within the project limits, the geologic formation or unit in which the fossil is located, and if the discovery resulted in a delay to the project construction. If an abundant number of fossil localities are discovered over 1 week, this report may be prepared on a weekly basis with a summary that includes all localities discovered over that weekly period.
- During monitoring of the ground-disturbing and excavation activities, sediment samples will be collected and processed through screens to recover microvertebrate fossils by the qualified paleontological monitors, as described in detail in the PMP. This processing will include either dry or wet screen washing and microscopic examination of the residual matrix to recover and identify any small vertebrate remains that may be present.
- All fossils collected will be prepared to a reasonable point of identification by qualified paleontologists. Excess sediment or matrix will be removed from the specimens to reduce the bulk of the material. An itemized inventory/catalog of all material collected and identified will be prepared using an Excel or Access type database in a format acceptable to the repository institution.
- A Paleontological Mitigation Report (PMR), which documents the results of the monitoring and recovery activities and the significance of the recovered fossils, will be prepared by the qualified principal

paleontologist and submitted for filing at RCTC and Caltrans within 4 months of the end of project construction activities that could potentially impact fossiliferous formations or geologic units. The PMR will follow the report guidelines in the Caltrans SER, Environmental Handbook , Volume I, Chapter 8 -Paleontology. Additional time may be required to prepare the PMR if an abundant number of paleontological resources are collected that require an additional amount of time for curation and analysis.

- The RCTC Project Manager and the qualified principal paleontologist will transfer all the collected fossils, the itemized inventory/catalog of those specimens, and a copy of the PMP to an established repository (Society of Vertebrate Paleontology, 1995 and 1996), such as the Western Science Center in Hemet, for permanent curation and storage.